

What is claimed is:

1. An image recognition apparatus comprising:  
an input unit for inputting image data; and  
a processor for executing a process comprising the steps

of:

- 1) detecting a character region where character images exist from image data input via said input unit;
- 2) recognizing character images in said character region to obtain character code data;
- 3) converting said character code data into output character images;
- 4) judging whether said output character images fit within said detected character region when said output character images are outputted; and
- 5) enlarging said character region within a specified range when said output character images do not fit into said character region and judging whether said output character images fit within the enlarged region.

2. An image recognition apparatus as claimed in claim 1 wherein,

when said processor judges that said output character images do not fit within said enlarged region, said output character images' size is reduced for outputting.

3. An image recognition apparatus as claimed in claim

1 wherein,

when said processor judges that said output character images fit within said character region or said enlarged region, said output character images' size is not changed for outputting.

4. An image recognition apparatus as claimed in claim 1 wherein,

when said processor judges that said output character images do not fit within said character region, said character region is enlarged within a range that does not cause any overlapping with other regions that contain images other than character images.

5. An image recognition apparatus as claimed in claim 1 wherein,

when said processor further judges whether multiple lines consisting of character images in said character region include an independent line that is independent from other lines and, if it is judged that the independent line is included, said steps 4) and 5) will be executed on character images that constitute said independent line line by line.

6. An image recognition apparatus as claimed in claim 5 wherein,

when the variations of the start point position and end point position of each line, which is constituted from

character images in said character region, relative to those of adjacent lines are greater than specified amounts, said processor judges that said line is the independent line.

7. An image recognition apparatus as claimed in claim 1 wherein,

said image data includes a background region with specified color or density as background for said character images, and

said character region is enlarged within the range of said background region when said processor judges that said output character images do not fit into said character region.

8. An image recognition apparatus as claimed in claim 7 wherein,

said processor further judges whether multiple lines consisting of character images in said character region include an independent line that is independent from other lines and, when it judges that the multiple lines include the independent line, detects layout styles of said independent line in said background region, and disposes output character images based on said detected layout styles.

9. An image recognition method comprising the steps of:

- 1) inputting image data;
- 2) detecting a character region where character images exist from the input image data;

3) recognizing character images in said character region to obtain character code data;

4) converting said character code data into output character images;

5) judging whether said output character images fit within said detected character region when said output character images are outputted; and

6) enlarging said character region within a specified range when said output character images do not fit into said character region and judging whether said output character images fit within the enlarged region.

10. An image recognition method as claimed in claim 9 wherein,

when it is judged at said step 6) that said output character images do not fit within said enlarged region, said output character images' size is reduced for outputting.

11. An image recognition method as claimed in claim 9 wherein,

when it is judged at said step 6) that said output character images fit within said character region or said enlarged region, said output character images' size is not changed for outputting.

12. An image recognition method as claimed in claim 9 wherein,

when it is judged at said step 5) that said output character images do not fit within said character region, said character region is enlarged within a range that does not cause any overlapping with other regions that contain images other than character images.

13. An image recognition method as claimed in claim 9 further comprising the step of:

7) judging whether multiple lines consisting of character images in said character region include an independent line that is independent from other lines, and wherein

if it is judged at said judging step 7) that the independent line is included, said steps 5) and 6) will be executed on character images that constitute said independent line line by line.

14. An image recognition method as claimed in claim 13 wherein,

when the variations of the start point position and end point position of each line, which is constituted from character images in said character region, relative to those of adjacent lines are greater than specified amounts, it is judged that said line is the independent line at said judging step 7).

15. An image recognition method as claimed in claim 9

wherein,

said image data includes a background region with specified color or density as a background for said character images, and

said character region is enlarged within the range of said background region when it is judged at said step 5) that said output character images do not fit into said character region.

16. An image recognition method as claimed in claim 15 further comprising the steps of:

8) judging whether multiple lines consisting of character images in said character region include an independent line that is independent from other lines; and

9) detecting layout styles of said independent line in said background region and disposing output character images based on said detected layout styles when it is judged at said judging step 8) that they include the independent line.

17. A computer readable program product for recognizing images, said program product causing the computer to execute a process comprising the steps of:

- 1) inputting image data;
- 2) detecting a character region where character images exist from the input image data;
- 3) recognizing character images in said character

region to obtain character code data;

4) converting said character code data into output character images;

5) judging whether said output character images fit within said detected character region when said output character images are outputted; and

6) enlarging said character region within a specified range when said output character images do not fit into said character region and judging whether said output character images fit within the enlarged region.

18. A program product as claimed in claim 17 wherein, when it is judged at said step 6) that said output character images do not fit within said enlarged region, said output character images' size is reduced for outputting.

19. A program product as claimed in claim 17 wherein, when it is judged at said step 6) that said output character images fit within said character region or said enlarged region, said output character images' size is not changed for outputting.

20. A program product as claimed in claim 17 wherein, when it is judged at said step 5) that said output character images do not fit within said character region, said character region is enlarged within a range that does not cause any overlapping with other regions that contain

images other than character images.

21. A program product as claimed in claim 17 wherein,  
said process further comprising the step of:

7) judging whether multiple lines consisting of  
character images in said character region include an  
independent line that is independent from other lines, and  
wherein

if it is judged at said judging step 7) that the  
independent line is included, said steps 5) and 6) will be  
executed on character images that constitute said independent  
line line by line.

22. A program product as claimed in claim 21 wherein,  
when the variations of the start point position and end  
point position of each line, which is constituted from  
character images in said character region, relative to those  
of adjacent lines are greater than specified amounts, it is  
judged that said line is the independent line at said judging  
step 7).

23. A program product as claimed in claim 17 wherein,  
said image data includes a background region with  
specified color or density as a background for said character  
image, and

said character region is enlarged within the range of  
said background region when it is judged at said step 5) that



said output character images do not fit into said character region.

24. A program product as claimed in claim 23 wherein, said process further comprising the steps of:

8) judging whether multiple lines consisting of character images in said character region include an independent line that is independent from other lines; and

9) detecting layout styles of said independent line in said background region and disposing output character images based on said detected layout styles when it is judged at said judging step 8) that they include the independent line.